REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject application are respectfully requested in light of the amendments above and the comments which follow.

As correctly noted in the Office Action Summary, claims 1-4 were pending. By the present response, claims 1-3 have been amended. Thus, upon entry of the present response, claims 1-4 remain pending and await further consideration on the merits.

Support for the foregoing amendments can be found at least at the following locations in the original disclosure: paragraph [0010]; and the original claims.

Entry of the foregoing is appropriate pursuant to 37 C.F.R. §1.116 for at least the following reasons: the foregoing amendments do not raise any new issues that would necessitate a new search; and the foregoing amendments clearly act to place the application in condition for allowance.

CLAIM REJECTIONS UNDER 35 U.S.C. §112, SECOND PARAGRAPH

Claim 4 stands rejected under 35 U.S.C. §112, second paragraph on the grounds set forth in paragraph 4 of the Official Action. This rejection is respectfully traversed.

Specifically, it is alleged in paragraph 4 of the Official Action that claim 4 is indefinite because:

> A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite . . . (emphasis added)

However, claim 4 does not contain a broad range or limitation together with a narrow range or limitation. Claim 4 depends from claim 3. Claim 3 recites a cutting depth of 0.2-2 mm. Claim 4, further defines the cutting depth as being within the range of "0.3-1.0 mm." There is nothing indefinite about claim 4. Claim 4 quite clearly further defines the cutting depth of claim 3, from which it depends. Thus, the rejection is improper and should be withdrawn.

CLAIM REJECTIONS UNDER 35 U.S.C. §102

Claims 1-2 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,655,860 to Oles (hereafter "*Oles*") on the grounds set forth in paragraph 5 of the Official Action. This rejection, as would be applied to the amended claims, is respectfully traversed.

The present invention is directed to a method for milling an object. In particular, the present invention is directed to a method for milling under dry conditions, using a silicon-nitride type cutting tool insert in a particular manner under a certain set of cutting conditions.

According to the present invention it was surprisingly found that by milling using silicon-nitride based inserts at a cutting speed above 1,000 m/min, and preferably at a cutting speed of 1,100-2,500 m/min, a longer tool life and increased productivity can be achieved. Problems associated with build-up edge wear disappeared at the above-

mentioned cutting conditions, while build-up edge wear remained under different conditions, including lower cutting speeds (see, e.g. - paragraph [0008]).

A method performed consistent with the principles of the present invention is set forth in amended claim 1. Amended claim 1 recites:

> *1. A method of dry milling a material comprising:*
> *providing a milling cutter with a silicon nitride based milling insert;*
> *cutting at a cutting speed of 1000-3000 m/min; and*
> *feeding to a cutting depth of 0.2-2 mm,*
> *wherein the material comprises aluminum and cast iron.*

According to a further aspect, a method performed according to the principles of the present invention is set forth in amended claim 3. Amended claim 3 recites:

> *3. A method of dry milling a composite material, the method comprising:*
> *providing a milling cutter with a silicon nitride based milling insert;*
> *cutting at a speed of 1100-2500 m/min; and*
> *feeding to a cutting depth of 0.2-2 mm.*

Oles fails to anticipate the presently claimed invention. *Oles* is directed to a milling cutter and method of milling. *Oles* teaches providing a milling head and method of milling which includes the use of both a milling insert as well as a wiper insert. More specifically, *Oles* teaches that the milling insert and the wiper insert are to be formed from different materials:

> The wiper insert is made of a grade different from that of the milling insert. Preferably, each milling insert is made of a first grade. (column 2, lines 40-42)

It is alleged in paragraph 5 of the Official Action that *Oles* teaches:

> Milling . . . with a silicon nitride milling insert (col. 5, lines 45-65).

The above-quoted assertion is incorrect.

The type of cutting arrangement described in *Oles* is further explained in Attachment A. As illustrated in Attachment A, a milling insert is first presented to the workpiece and provides the majority of material removal therefrom. A wiper insert trails the milling insert, and provides a smoothing effect to the cutting operation.

The portion of column 5 relied upon by the Examiner reads as follows:

> In another test (Test No. 5), the milling insert was a single KCD25 (SPGN-422) tool and a three-nose-radius ceramic insert, made from Kennametal ceramic grade KYON 3500, and of a style SPGN-433T (sharp chamfered cutting edge) was employed in the wiper position. The KYON 3500 grade is a silicon nitride grade of material covered by U.S. Pat. No. 5,382,273, to Mehrotra et al., entitled SILICON NITRIDE CERAMIC AND CUTTING TOOL MADE THEREFROM, KYON 3500 cutting inserts are also commercially available from Kennametal Inc., of Latrobe, Pa.

As readily apparent from the above, milling insert taught by *Oles* in the form of a diamond-coated cemented carbide ("KCD25 cutting inserts have a 25 to 30 μm thick diamond coating adherently bonded to a cemented tungsten carbide-cobalt substrate") (column 3, lines 57-59).

The KYON insert is clearly employed in the wiper position, and does not constitute a milling insert as alleged. *Oles* teaches utilization of a diamond coated cemented carbide milling insert in order to perform the bulk of the material removal from the workpiece. The silicon nitride wiper insert is relied upon for finishing/smoothing purposes.

By contrast, the method of the present invention relies upon a silicon nitride cutting insert as the milling insert. Thus, *Oles* clearly fails to anticipate amended claim 1. Claim 2 depends from claim 1. Thus, *Oles* fails to anticipate claim 2 for the same reasons noted above. Reconsideration and withdrawal of the rejection is respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 3-4 stand rejected under 35 U.S.C. §103(a) as being obvious over *Oles* on the grounds set forth in paragraph 6 of the Official Action. This rejection is respectfully traversed.

It is alleged in paragraph 6 of the Official Action that *Oles* teaches all aspects of the claimed invention with the exception of the cutting speed and depth of cut recited by claim 3. Acknowledging these deficiencies, it is nonetheless asserted that claims 3 and 4 would have been rendered obvious solely upon the teachings of *Oles*.

However, as explained above, the method of the presently claimed invention includes the step of "providing a milling cutter with a silicon nitride based milling insert."

Nowhere does *Oles* disclose, or even suggest, at least this aspect of the presently claimed invention. Thus, for reasons similar to those explained above, *Oles* fails to disclose, or even suggest, the subject matter of amended cliam 3. Reconsideration and withdrawal of the rejection is respectfully requested.

Claim 4 depends from cliam 3. Thus, claim 4 is also distinguishable over *Oles* for at least the same reasons noted above.

CONCLUSION

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

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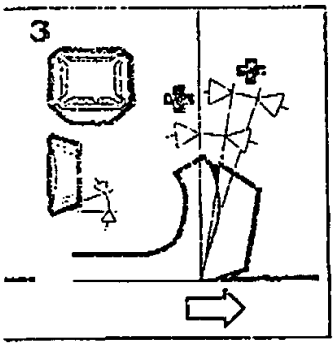
Date: October 6, 2003



contact between chip and in-
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·rts to improve surface texture.

· may be provided with a ra-
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dvantage, however, is the in-
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where the use of **parallel land**
the insert comes in. This is a
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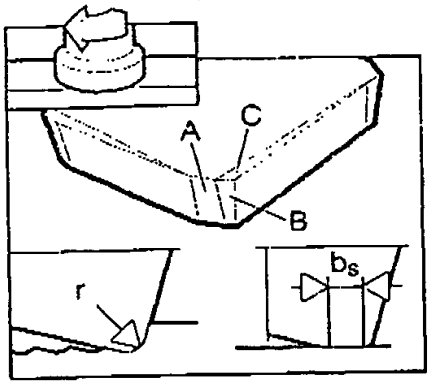


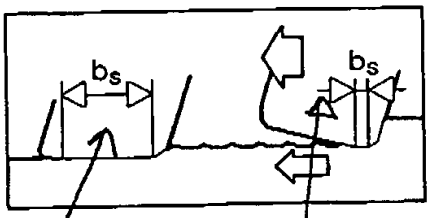
The abrupt changes entailed with parallel lands in the direction along the cutting edge, however, can lead to a weaker edge than those having a radius. For this reason **chamfers (B)** are applied on the corners. These are angular flats between the parallel land to the next cutting edge.

The **negative land (C)** has a strengthening effect on the cutting edge. Negative lands are employed frequently on milling inserts and are especially useful for steel machining as they strengthen the edge against impact stresses. These lands, however, may require more power in cut and need to be carefully established in relation to the application. Negative lands are not as critical for cast-iron milling, a honed edge will often be suitable. Materials like aluminium alloys demand extremely sharp cutting edges and edge preparation, not much beyond that of making sure the edge is very sharp, is required. The type and amount of edge preparation can to some extent be related to the size of the rake angle suitable for the material.

When **surface texture** demands are high and, especially when the feed rate is high, the parallel lands may not be a sufficient means with which to obtain satisfactory surface. The milling cutter consists of several cutting edges and to obtain high surface texture, the parallel land on the edges should be set extremely close in relation to each other axially. The machined surface is formed by the lowest parallel lands and to set these close enough to achieve very good surface requires either extensive setting or that the cutter is ground on its axial face. Neither alternative is attractive because of the time and costs that are involved.

Modern milling cutters are, however more, accurate and a complimentary solution is the use of wiper inserts. These provide a much larger flat length (b_s). The flat is located just below the other ordinary parallel land inserts and wipes the surface smooth - it is a finishing cutting edge that has been added to the cutter.

The flat length is dimensioned to cover the feed per revolution. The wiper-flat insert produces good surface textures even under unfavourable machining conditions.



wiper insert

milling insert

ATTACHMENT A